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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**UTILITY APPLICATION AND APPLICATION FEE TRANSMITTAL (1.53(b))**

ASSISTANT COMMISSIONER FOR PATENTS  
Box Patent Application  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of

Named Inventor(s) and  
Address(es):

Ilya A. Korisch and Mikhail Sumetski

For:

APPARATUS FOR LOCAL REDUCTION OF ELECTROMAGNETIC FIELD  
USING AN ACTIVE SHIELD AND METHOD THEREOF

Enclosed are:

☒ 6 page(s) of specification, 1 page(s) of Abstract, 6 page(s) of claims

☒ 2 sheets of drawing      ☒ formal    ☐ informal

☐ \_\_\_\_\_ page(s) of Declaration and Power of Attorney

- ☐ Unsigned
- ☐ Newly Executed
- ☐ Copy from prior application

☐ Deletion of inventors including Signed Statement under 37 C.F.R. § 1.63(d)(2)

☐ Incorporation by Reference: The entire disclosure of the prior application, from which a copy of the combined declaration and power of attorney is supplied herein, is considered as being part of the disclosure of the accompanying application and is incorporated herein by reference.

☐ Microfiche Computer Program (Appendix)

☐ \_\_\_\_\_ page(s) of Sequence Listing

- ☐ computer readable disk containing Sequence Listing
- ☐ Statement under 37 C.F.R. § 1.821(f) that computer and paper copies of the Sequence Listing are the same

- [illegible]

## I. CALCULATION OF APPLICATION FEE (For Other Than A Small Entity)

	Number Filed	Number Extra	Rate	Basic Fee
Total				\$690.00
Claims	29	-20= 9	x\$18.00	\$162.00
Independent				
Claims	7	- 3= 4	x\$78.00	\$312.00
Multiple Dependent Claims	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no			Additional Fee = \$260.00 Add'l Fee = NONE

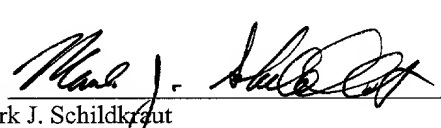
Total: \$1,164.00

- ☐ A statement claiming small entity status is attached or has been filed in the above-identified parent application and its benefit under 37 C.F.R. § 1.28(a) is hereby claimed. Reduced fees under 37 C.F.R. § 1.9(F) (50% of total) paid herewith \$ \_\_\_\_\_.
- ☐ A check in the amount of \$\_\_\_\_\_ in payment of the application filing fees is attached.
- ☒ Charge Fee(s) to Deposit Account No. 12-2325. Order No. IDS No. 117867. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.
- ☒ The Assistant Commissioner is hereby authorized to charge any additional fees which may be required for filing this application, or credit any overpayment to Deposit Account No. 12-2325. Order No. IDS No. 117867. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,

MORGAN &amp; FINNEGAN, L.L.P.

Dated: September 29, 2000

 By:   
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Ilya A. Korisch, et al. Group Art Unit: Not yet assigned  
Serial No. : Not yet assigned Examiner: Not yet assigned  
Filed : Herewith (September 29, 2000)  
For : APPARATUS FOR LOCAL REDUCTION OF ELECTROMAGNETIC  
FIELD USING AN ACTIVE SHIELD AND METHOD THEREOF

EXPRESS MAIL CERTIFICATE

Express Mail Label No. EL 632 223 500 US

Date of Deposit September 29, 2000

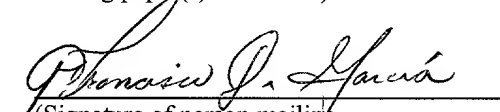
I hereby certify that the following attached paper(s) and/or fee

1. Utility Application and application Fee Transmittal;
2. Application consisting of 6 pgs. of specification, 1 page of Abstract; 6 pgs. of Claims; and 2 sheets of drawings
3. return receipt postcard

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
U.S. PATENT APPLICATION

FOR:

APPARATUS FOR LOCAL REDUCTION OF ELECTROMAGNETIC  
FIELD USING AN ACTIVE SHIELD AND METHOD THEREOF

INVENTORS:

Ilya A. Korisch

Mikhail Sumetski

**APPARATUS FOR LOCAL REDUCTION OF ELECTROMAGNETIC  
FIELD USING AN ACTIVE SHIELD AND METHOD THEREOF**

5

**Field of the Invention**

The present invention relates to shield devices and more particularly pertains to a shield device which may be used to protect a user from electromagnetic fields emitted by an antenna.

10

**Description of the Prior Art**

In recent years, as the number of wireless devices has grown, so has the concern about harm to the user from electromagnetic radiation. Although the level of electromagnetic radiation emitted by such devices is relatively low, the antenna which emits the radiation is close to the head, and there is also concern that the radiation can have a cumulative effect.

15

20

In the past, there have been some attempts to protect the users of wireless devices from such radiation, however, none of those approaches has been entirely satisfactory.

25

**Summary of the Invention**

The present invention includes a method and apparatus for protecting an operator from electromagnetic fields emitted by an antenna.

5           The present invention further includes an apparatus having an antenna creating an electromagnetic field, and an active shield substantially canceling the effects of the electromagnetic field in a predetermined region.

10           The present invention further includes a communication apparatus having an antenna creating an electromagnetic field, and a plurality of active shields for canceling the effects of the electromagnetic field in a predetermined region.

15           The present invention further includes a communication apparatus having an antenna creating an electromagnetic field, and a means for canceling the effects of the electromagnetic field in a predetermined region.

20           The present invention further includes a method comprising generating an electromagnetic field from an antenna, and canceling the effects of the electromagnetic field in a predetermined region using an active shield.

### **Brief Description of the Drawings**

Fig. 1 is a side elevational view of a communication device such as a portable telephone with active shields;

Fig. 2 is a block diagram illustrating the elements of  
5 the first embodiment; and

Fig. 3 is a block diagram illustrating the elements of the second embodiment.

### **Detailed Description**

10 Fig. 1 is a side view of the portable or personal communication apparatus 10 with only a few portions of such apparatus identified. (It should be noted that although the terms personal communication apparatus, wireless communication  
15 device, wireless device, wireless telephone are used, these terms are interchangeable and mean any portable device that emits electromagnetic fields, particularly those that are frequently place near a user's head and/or person.) An antenna  
20 12 is shown extending upwardly from the apparatus 10. Active shields or radiators 14a-14c are shown arranged between the antenna 12 and/or the RF circuitry of the device (not shown) and the operator's ear piece 10a. Active shields 14a-14c are radiating devices that substantially cancel or reduce the electromagnetic field(s) from the device 10 and/or the antenna



12 in a predetermined area. In this case the predetermined area is the operator's head which is substantially located near the radiators 14a-14c. The number of active shields may range anywhere from one to five or greater depending on the requirements of the communication apparatus 10. The active shields 14a-14c create a near field which is opposite to that produced by the antenna 12 and the device 10.

Fig. 2 illustrates a block diagram of a first embodiment. Antenna 12 is connected to the RF circuitry section of the device (not shown in Fig. 2) which contains a controller (e.g., microprocessor) through line 16. The controller may be the main controller of the communication device 10 or an extra controller. Located between antenna 12 and the RF circuitry section of the device is a coupler 20. Coupler 20 diverts a small portion of the signal (approximately 10%) traveling from the circuit board to the antenna. In one embodiment, coupler 20 is connected to active shields (or radiators) 14a-14c. Located between coupler 20 and active shields 14a-14c are adjustment circuits 22a-22c. Adjustment circuits 22a-22c each include variable phase shifters 24a-24c and variable gain amplifiers 26a-26c. Variable phase shifters 24a-24c substantially adjust the phase of the signal. As a result, the electromagnetic field strength produced by the antenna which may be absorbed by a user

is reduced in effect by the active shields 14a-14c in the region around the earpiece 10a.

Fig. 3 illustrates a block diagram of a second embodiment. Antenna 12 is connected through line 16 to circuit board 42 and controller 40 (e.g., a microprocessor). Coupler 20 is connected to active shields 36a and 36b. Between coupler 20 and active shields 36a-36b are located adjustment circuits 30a and 30b. Adjustment circuits 30a and 30b include variable phase shifters 32a-32b and variable gain amplifiers 34a-34b. The second embodiment further includes sensors 38a and 38b which are located near active shields 36a and 36b, respectively. The sensors measure the electromagnetic field strength in the environment of the shields 36a-36b and send feedback signals along lines 46a and 46b to the controller 40. (The controller 40 may be the main processor for the communication device 10 or it may be a dedicated processor for controlling the active shields 36a-36b). Controller 40 is coupled to the variable phase shifters 32a-32b through lines 44a and 48a. Controller 40 is coupled to the variable gain amplifiers 34a and 34b through lines 44b and 48b. Controller 40 adjusts the variable phase shifters and variable gain amplifiers in response to the readings from the sensors 38a and 38b. Although the second embodiment discloses each active shield with a sensor, in an

It is understood that the present invention has been described hereinabove by way of example and by preferred

[illegible]

**CLAIMS**

What is claimed is:

1. An apparatus having an RF circuitry portion comprising:  
an antenna creating an electromagnetic field; and  
an active shield substantially canceling the effects of the electromagnetic field in a predetermined region.

2. The apparatus of claim 1, wherein said active shield is coupled to the RF circuitry portion of the device.

3. The apparatus of claim 2, further comprising:  
an adjustment circuit located between said antenna and said RF circuitry portion.

4. The apparatus of claim 2, further comprising:  
a coupler located between said RF circuitry portion and said active shield.

5. The apparatus of claim 3, further comprising:  
a coupler located between said RF circuitry portion and said adjustment circuit

1           6.    The apparatus of claim 3, wherein said adjustment  
2 circuit receives a reduced antenna signal.

1           7.    The apparatus of claim 6, wherein said reduced antenna  
2 signal is approximately ten percent of the antenna signal.

1           8.    The apparatus of claim 3, wherein said adjustment  
2 circuit includes a phase shifter.

1           9.    The apparatus of claim 3, wherein said adjustment  
2 circuit includes a variable gain amplifier.

1           10.   The apparatus of claim 3, wherein said adjustment  
2 circuit includes an attenuator.

1           11.   The apparatus of claim 3, further comprising:  
2               a sensor located in proximity to said active shield.

1           12.        The apparatus of claim 3, further comprising:  
2               a feedback circuit for controlling the adjustment  
3 circuit.

1           13.        The apparatus of claim 1, wherein said  
2 predetermined region is near an operator's earpiece.

1           14. A communication apparatus having an RF circuitry  
2     portion comprising:  
3                 an antenna creating an electromagnetic field; and  
4                 a plurality of active shields for canceling the  
5     effects of the electromagnetic field in a predetermined region.

1           15. The communication apparatus of claim 14, further  
2     comprising a plurality of adjustment circuits located between  
3     the RF circuitry portion and said plurality of active shields.

1           16. The communication apparatus of claim 15, wherein each  
2     of said adjustment circuits include a phase shifter and a  
3     variable gain amplifier.

1           17. The communication apparatus of claim 15, further  
2     comprising:  
3                 a plurality of feedback circuits to control the active  
4     shields.

1           18. The communication apparatus of claim 15, wherein said  
2     number of active shields is approximately four.

1           19. A communication apparatus comprising:  
2                 an antenna creating an electromagnetic field; and

3           a means for canceling the effects of the  
4 electromagnetic field in a predetermined region.

1           20. A method comprising:  
2           generating an electromagnetic field from an antenna;  
3 and  
4           canceling the effects of the electromagnetic field in  
5 a predetermined region using an active shield.

1           21. The method of claim 20, wherein the step of canceling  
2 further comprises:  
3           coupling an RF circuitry portion to an active shield  
4 through an adjustment circuit.

1           22. The method of claim 20, wherein the step of canceling  
2 further comprises:  
3           phase shifting and amplifying a signal from the  
4 antenna before the signal reaches the active shield.

1           23. The method of claim 22, wherein the step of canceling  
2 further comprises:  
3           feeding back from a sensor located in proximity to  
4 said active shield a signal which is used to vary the phase  
5 shifting and amplifying.

1           24. A method comprising:  
2                 generating an electromagnetic field from an antenna;  
3 and  
4                 canceling the effects of the electromagnetic field in  
5 a predetermined region using a plurality of active shields.

1           25. An apparatus comprising:  
2                 means for generating an electromagnetic field from an  
3 antenna; and  
4                 means for canceling the effects of the electromagnetic  
5 field in a predetermined region using an active shield.

1           26. The apparatus of claim 25, wherein the canceling means  
2 further comprises:  
3                 means for coupling an RF circuitry portion to an  
4 active shield through an adjustment circuit.

1           27. The apparatus of claim 25, wherein the canceling means  
2 further comprises:  
3                 means for phase shifting and amplifying a signal from  
4 the antenna before the signal reaches the active shield.



1        28. The apparatus of claim 27, wherein the canceling means  
2 further comprises:

3                means for feeding back from a sensor located in  
4 proximity to said active shield a signal which is used to vary  
5 the phase shifting and amplifying.

1        29. An apparatus comprising:

2                means for generating an electromagnetic field from an  
3 antenna; and

4                means for canceling the effects of the electromagnetic  
5 field in a predetermined region using a plurality of active  
6 shields.

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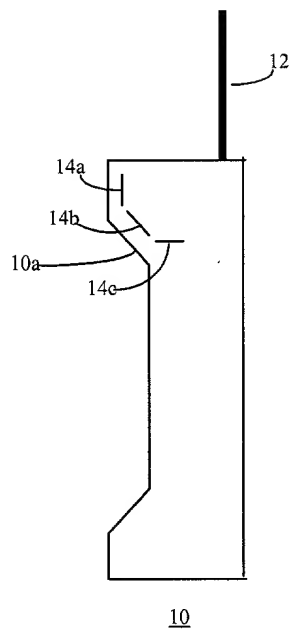


FIG. 1

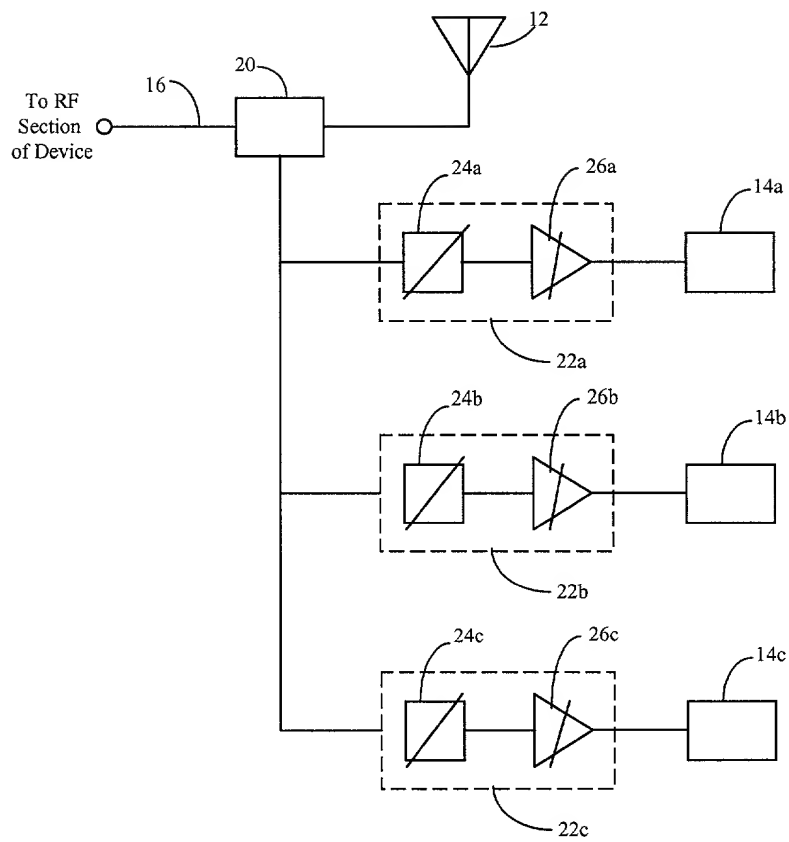


FIG. 2

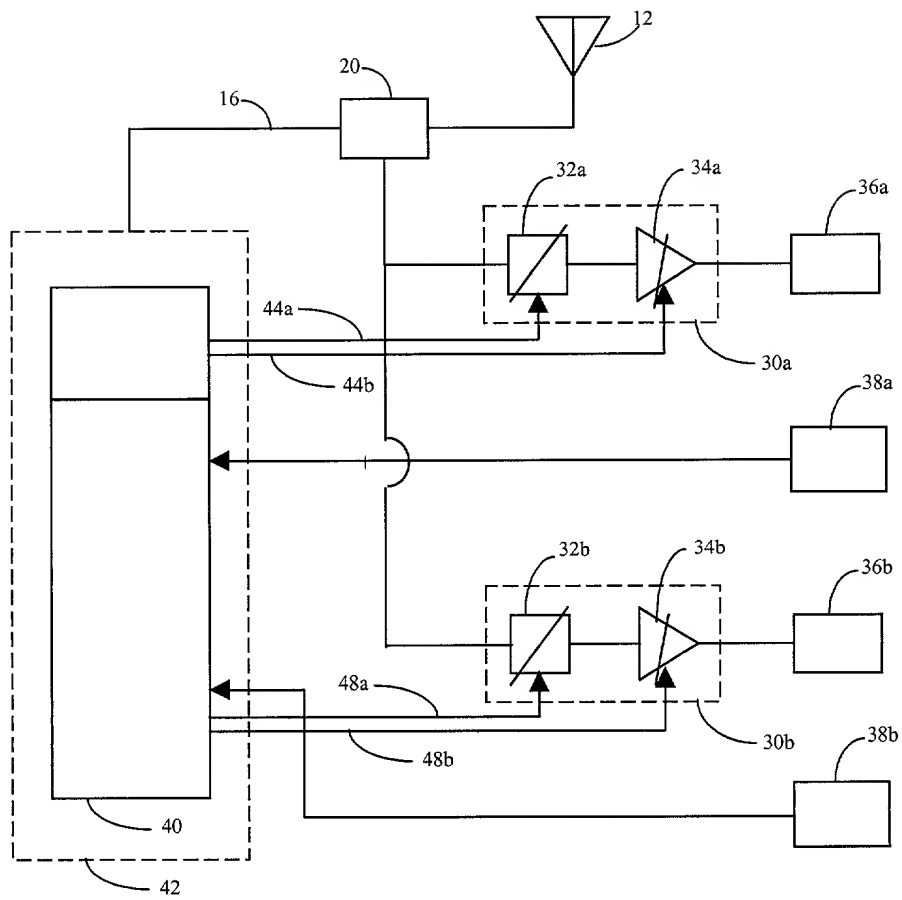


FIG. 3